Relationality and Networks

Course Description

We see connection all around us: cities linked by roads, humans bound by friendship, countries tied through trade. This course teaches you to see many phenomena as interrelating units, with special emphasis on the concept of a "network". The goal is to become habituated to rigorous relational thinking that helps uncover the profoundly patterned and often unexpected ways in which the world works.

Course Rationale

This course should be taken by anyone with an interest in how networks affect what we think, say, and do, and how they affect what others think, say, and do about us. We cover an eclectic survey of studies that use both words and numbers to understand interaction; students from any background will frequently find themselves in unfamiliar territory (in fact, set aside an hour each week for reading Wikipedia articles about unfamiliar background in the week's readings). Consider these questions:

- how are major global cities interconnected by advertising agencies?
- does having more friends make you less likely to get a cold?
- can brainless slime mold design railway systems as well as we do?
- why are people more coherent when writing about their past than about their present?
- are people meant to relate to one another as the Father does to the Son and the Holy Ghost?

This course prepares you to tackle these questions, and more!

Learning Goals for the Course

By the end of this course you will...

- See ties and networks in any phenomenon you encounter (and wonder if you should)
- Know how to read scholarly literature in several branches of network analysis
- Explain, in words and numbers, how a wide variety of networks function

Specific Learning Objectives

To achieve the overall course goals you will...

- **Learn and apply** the exact terminology of network analysis and graph theory
- **Identify** specific network theories, methods, and authors and **summarise** their approaches
- **Differentiate** among different paradigms in network analysis
- **Critically evaluate** which network-analytic tool is best for studying a particular phenomenon
- **Describe** various network phenomena using both words and numbers
- **Find and evaluate** descriptions of networks in the real world

- **Improve your communication skills** through writing exercises, class discussions, and oral presentations

Course Format

Class Time
TBA

Blackboard
You are required to register with the course blackboard site no later than the 2nd week of class. For instructions on doing so please visit: [link]

All course documents, including assignment guidelines and reading assignments, will be posted on the course blackboard page. In addition, reflection responses will be posted in designated discussion forums. Blackboard will also be used for assignment submissions and for the distribution of your grades.

Course Expectations

In order to achieve the objectives of this course, you are expected to...
- attend classes regularly and on time
- complete assigned readings and answer related questions before class
- meet due dates and be rigorous in all your assignments
- participate actively and thoughtfully in class discussions and on the online discussion board
- work faithfully on collaborative tasks
- research something you are interested in
- provide the instructor with constructive feedback about the course

Assessment of Learning

Assignments	Type	Grade (%)	DUE
Weekly Network Sketches	Individual	10	Weekly
Problem Sets	Pairs	40	Bi-Weekly
Mid-Term Exam	Individual	15	TBD
Website/Media Review	Individual	10	TBD
Final Research Paper	Individual	25	TBD
	Total	100	

Assignments

1. Weekly Network Sketches (10%)

By the end of each week you are required to submit two sketches of networks based on the previous week's reading: if the previous week we read about interactions between ants and friendship in

dolphins, you are to submit a sketch of a network that schematically expresses these relationships (see examples on Blackboard) – you may not copy networks that appeared in the reading. This exercise helps you be explicit in your relational/network thinking, and it also helps you see when networks might *not* be the best way to think of a phenomenon, since even a simplified version is hard to draw.

Assignment Guidelines:
- I provide three examples to get you started. Generally we ask for simple sketches that capture the heart of the interactional system – if you want to hand in detailed artwork, you are free to do so.
- Every sketch should include a legend that explicitly states what the nodes are (cities, people, companies?), what the edges represent (friendship, transactions, war?), and what other symbols means (e.g., different node colours, or different edge thickness).
- Post responses on Blackboard by 11:59PM on Saturday – one scan or picture per sketch, two scans/pictures in total.
- We will use the first 5 minutes of each Tuesday class period to go over some main themes from the previous week's sketches.
- We mark the sketches on completeness, not correctness (and reserve the right to grade incomplete obviously rushed and superficial sketches). Each sketch is worth ½ point, for one point per week, and ten points for the whole semester.

2. Mid-Term Exam (15%)

There will be one mid-term exam ("prelim") which, under stressful time constraint, will test your ability to remember, identify and use important terms and ideas introduced in the first month of the course. This evaluation is meant to test your fluency in basic network analysis jargon and concepts *before* we dive into readings that use such vocabulary without defining it beforehand.

The exam is an occasion for you to evaluate your own understanding: if you receive below a B or less, you will have the chance to write a similar make-up exam, and I will use the average of the two. It is important to master the basics so that you can effectively move on to more complex writing and research.

3. Problem Sets (40%)

There will be one problem set due roughly every two weeks. Two thirds of these problem sets involve mathematics (mostly arithmetic, simple algebra, and logic) while the other third consist of five-page essays. In both cases you will be answering specific questions. The purpose of these assignments are to make you comfortable with reasoning about networks using both words and numbers – most of the studies we read are a combination of both.

Struggling through problem sets is often more productive in pairs: it takes significantly less time because you teach each other. You will therefore be randomly assigned a partner to work with throughout the semester, and will have the chance to change your parter after you have submitted the first problem set together.

4. Website/Media Review (10%)

These days networks are a hot topic. Reports about Facebook facilitating fake news, intelligence agencies breaking up international spy rings, and diseases spreading at lighting speed are only some of the topics that may come up. Knowing what is being discussed in the media is one way of finding out how people are thinking about networks at a given point in time. The purpose of this assignment is to (1) become more aware of the ways in which networks are topics of public concern, and (2) learn to asses the validity of the article by hunting for assumptions and biases and determining whether the arguments are supported by evidence.

Assigned Guidelines:
- Chose an article from a popular press media source (newspaper, magazine, website) that discusses an issue related to networks. This should be a current topic (i.e., posted in the last year)
- Prepare a written summary and critique of the article you have chosen (300-500 words)
- The written summary and critique should include the following:
  - What is the main point of the article?
  - Why is this a relevant issue? – What are the cultural, religious, technological or economic factors that make it an important issue?
  - Does the article provide balanced coverage of the topic? – Explain
  - What are the assumptions or biases? – Who is writing the article? Who is the audience?
  - Can this article and the arguments in it be substantiated by evidence? E.g., scientific studies, surveys, legal documentation?
  - What would make this a better article?
- If possible include a copy of the article with your review or a link to the website where it was found. If it is from a magazine or newspaper, include a citation which reports the source, date, title, author, and any other pertinent information.
- Assignments will be submitted via "Dropbox" on Blackboard
- We will use a portion of the class period following the due date of this assignment for you to share your article review within small groups of 3-4 people.

5. Final Research Paper (25%)

Toward the end of the semester you will write a 10-15 page research paper on a topic of your choosing. This will be the culmination of your studies throughout the semester and gives you a chance to spread your wings and tackle a subject that you care about, from a networks perspective. You are expected to do so in a scholarly fashion, and therefore must employ *at least* five peer-reviewed, scholarly sources that are not part of the assigned readings, in addition to whatever syllabus material you may wish to incorporate.

To make sure that you are headed in the right direction, and that you are looking for information in the right places, you will first submit an outline of your paper, along with potential sources – this will be worth 5%. We will give you feedback on the outline, which will help you craft the rest of the paper, worth 20%, for a total of 25%.

You should also keep in mind the following:

- No curve: students are graded on absolute, not relative, performance.

- Good will: there are a number of things you can do to go above and beyond what is required. Doing them may result in good things coming your way, such as deeper learning, a bump in your final grade (from, say, B+ to A-) or, in exceptional circumstances, two bumps (B+ to A), or a strong letter of recommendation from the instructor. The following things generate good will: completing extra credit problems on the assignments, completing assignments at least four days before the deadline and giving the instructor feedback on it, demonstrating leadership during in-class activities, and regularly responding to other students' question in the online discussion.

- Slip days: you will have two slip days throughout the semester to use for the problem sets. That is, you can, without any harm to your grade, take up to two extra days on any of the problem sets: for instance, one extra day for problem set 3 and and one extra day for problem set 4, or two extra days for problem set 5. Once you have used up these slip days you must submit every problem set the day it is due – no other late submissions will be accepted.

- Planned absence: if you have another commitment that compels you to miss class, you are expected to notify the instructor via email on or before the second day of class. In your email, please explain the other commitment and why it takes precedence over this course. If you are missing the course for a team-related reason, we expect some kind of signed document (letter, schedule of meets) from your coach or director. If you are missing a longer period of time, you are expected to propose a plan for how, during your absence, you will continue to learn the material and complete any course requirements.

- Unplanned absence: in compliance with university guidelines, if an unexpected and unavoidable circumstance compels you to miss class, you are expected to contact the instructor as soon as possible.

- SUS option: for students taking the course under the satisfactory-unsatisfactory option, you will be assessed as though you were taking the course for grade. A grade of [XX – following department guidelines] or higher will be considered satisfactory.

How to Succeed

- Participate

- Keep track of the hours it takes to do the problem sets. If you are spending more time than is expected for this course, consult with the instructor.

- Start problem sets within two days after they are posted. Get as far as you can on your own, identify questions you have, and then seek help from peers or the instructor.

- Try to accumulate good will.

Writing Guidelines

In order to fulfill the writing requirements for this course, your media review, essay-style problem sets, and the final paper should conform to the following guidelines (you may *neatly* write the numerical problem sets in pen or pencil). These guidelines may seem arbitrary, but they are important because they demonstrate that you have submitted your written work to a process of basic editing, formatting and polish, and that you are aware of the formal standards and conventions of formatting and editing required of writing in the "real world". I will not accept papers that do not meet the following formatting guidelines and minimum formal criteria for polish and presentation.

Formatting:
- word-process all out-of-class written work. "One page" ~ 275 words
- use standard font, in 12 point
- double-space, using 1-inch margins
- number your pages and include your name in the header or the footer
- at the top of the first page include your name, assignment descriptor (namely, "Problem Set 4", "Media Review", "Final Research Paper"), and date
- For your final research paper, include a title, centered on the first page – cover pages aren't necessary
- Use ASA (American Sociological Association) format, the citation style preferred in sociology. You should provide well-formatted in-line citations as well as a list of works cited.
- The works cited/bibliography/references section and appendices do not count towards the total page or word counts. If you find yourself using graphs or figures, include these in an appendix at the end of the paper, which you cite throughout – for example, "Hollow-core networks (Appendix A, Figure 3), show that...".

Polish and Presentation:
- Proofread and spell-check
- Edit all drafts to avoid Lunsford's "Top Twenty" most common errors in undergraduate writing
- Staple or paper-clip your pages together

Helpful Tips:
- Whenever possible, seek out feedback on drafts and have someone with fresh eyes read through your written work before it is due. The Knight Institute Writing Walk-In Service is an excellent resource at any stage of the writing process.
- Remember to keep back-up copies of your work for revisions, in case the instructor loses the original (happens rarely, don't let it happen to you), and for consultation in latter projects or courses.

Public Writing and Sketches

In this class, all writing and sketches you turn in is considered public: you should be prepared to share it with your peers, as well as your instructor. Throughout the semester, we will have opportunities to share our output through collaboration and peer review. From time to time, I may also select examples from your sketches and essays in order to raise specific issues of relevance to the whole group. I will do my best to keep these examples anonymous; nevertheless, students are

advised that assignments submitted for this course may be read and shared by all members of the class.

The Knight Institute Writing Walk-In Service

The Writing Walk-In Service (WWIS) provides support for individuals at any stage of the writing process. It is a free resource available to everyone on campus – faculty, staff, graduate and undergraduate studets – for nearly anny kind of writing project: applications, presentations, lab reports, essays, papers, and more. Tutors (trained undergraduate and graduate students) serve as responsive listeners and readers who can address questions about the writing process or about particular pieces of writing. They can also consider questions of confidence, critical reading, analytic thought, and imagination. Many writing tutors also have experience working with non-native speakers of English.

The WWIS operates out of XX campus locations. During the academic year, the WWIS is open [look up current schedule]. Writers can schedule appointments or drop in at a convenient time. For more information or to schedule an appointment: http://knight.as.cornell.edu/walkin/walkin.htm

Code of Academic Integrity

The assignments you submit for this course must be entirely your work (with the exception of the problem sets – see below); any outside material must be cited accurately and completely. In this course, you are expected to use ASA citation format for in-line citations and works cited lists. All written work must have been written for this course and not another and must originate with you in form and content with all contributory resources fully and specifically acknowledged. You will want to familiarise yourself with Cornell's Code of Academic Integrity and Acknowledging the Work of Others. You will furthermore be required to complete a brief online quiz on plagiarism, due by the second week of classes.

Collaborative work of the following kinds is authorised in this course: peer review and critique of students' essays by one another, along with problem sets. You are also encouraged to discuss with others outside your group provided that the discussion does not result in an exchange of solutions or partial solutions. You can talk about the course material, the problem, general approaches to the poblem, but not specific details of the solution. Two good rules of thumb: bring to the discussion only your brain, the textbook, and the assignment description; take from the discussion only a renewed understanding – i.e., do not write notes, do not exchange calculations.

Students With Disabilities

In compliance with Cornell University policy and equal access laws, I am available to discuss appropriate academic accommodations that may be required for students with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except in unusual circumstances, so that arrangements can be made. Students are encouraged to contact Student Disability Services and myself for a confidential discussion of their individual needs. Student Disability Services is located at 420 CCC, and staff can be reached at 607-254-4545.

Acknowledgements

Many thanks to the students and instructor of ALS 6015 – Spring 2017 (Cornell University) for helping me craft this syllabus, to colleagues in the Department of Sociology at Cornell (especially

Christopher Cameron), as well to Michael Hay, Julie M. Huzzey, Alexis Briley, and John Levi Martin, whose syllabi I have used as inspiration

Course Schedule – Readings and Themes

*note: (graduate students must read the texts assigned to undergradutes **in addition to** those marked as only "graduate" unless stated otherwise)*

PART 1: THEORY AND FORMALISM

Week 1: Relationality, and Networks, and Alternatives

Undergraduate Readings: Monge & Contractor, *Theories of Communication Networks*, pp. 11-19; Christakis & Fowler, *Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives*, Ch.9

Graduate Readings: Emirbayer, Mustafa. 1997. "Manifesto for a Relational Sociology." *American Journal of Sociology* 103(2):281–317.; Simmel, George. 1955. *Conflict And The Web Of Group Affiliations*. Free Press. (online)

Consider the following expressions:
- "pull yourself up by your bootstraps"
- "he knew the right people"
- "the nail that sticks out gets hammered down"
- "don't you want to be a part of something bigger?"

These idioms reveal common ways that we approach a situation. In academic research we often take such habits of thought and make them exact: we might say that the above are representative of atomistic, relationalistic, field-istic, and holistic modes of thought. This first week we situate the relational mode of thinking vis-a-vis its alternatives, and argue that it helps us study phenomena where other approaches (especially atomism, or individualism) fall short. We also discuss the concept of "network" and how it compares to others forms of organisation, like dyads or hierarchies.

Week 2: Graph Formalism and Connectivity

Undergraduate and Graduate Readings: Wasserman, Stanley and Katherine Faust. 1994. *Social Network Analysis: Methods and Applications* , Chs. 2-4

Graph theory is a mathematical formalisation of the relational approach, and many of the empirical network studies since the 1950s make explicit use of grraph-theoretic concepts. Over the next couple of weeks we will introduce the various measures of network theory – in the first week, we look at graphs, edges, nodes, paths, and degrees.

Week 3: Centrality and Clustering

Undergraduate and Graduate Readings: Wasserman, Stanley and Katherine Faust. 1994. *Social Network Analysis: Methods and Applications* , Chs. 5-8

Additional Graduate Student Reading: Flache, Andreas and Michael W. Macy. 2011. "Small Worlds and Cultural Polarization." *The Journal of Mathematical Sociology* 35(1–3):146–76.

Some of the most interesting questions have to do with who (or what) is at the center of a network, and what are different network clusters. Are people in the center of a friendship network the most popular? Do all roads lead to Rome? What are the cliques in a high school? Is the network highly dense, or made up barely-communicating chunks? We study several ways of quantifying both centrality and clustering in networks.

Week 4: Homophily and Network Change

Undergraduate Readings: Travers, Jeffrey and Stanley Milgram. 1967. "The Small World Problem." *Phychology Today* 1(1):61–67.; Granovetter, Mark S. 1973. "The Strength of Weak Ties." *American Journal of Sociology* 78(6):1360–80.; Monge, Peter R. and Noshir S. Contractor. 2003. *Theories of Communication Networks*. Ch. 8

Graduate Readings: McPherson, Miller, Lynn Smith-Lovin, and James M. Cook. 2001. "Birds of a Feather: Homophily in Social Networks." *Annual Review of Sociology* 415–444.; Mercken, Liesbeth, Tom A. B. Snijders, Christian Steglich, and Hein de Vries. 2009. "Dynamics of Adolescent Friendship Networks and Smoking Behavior: Social Network Analyses in Six European Countries." *Social Science & Medicine* 69(10):1506–14.; Monge, Peter R. and Noshir S. Contractor. 2003. *Theories of Communication Networks*. Ch. 6

In many networks similar units tend to interact more with each other than with dissimilars, a phenomenon known as "homophily". Looking into its causes leads us to consider several interactional proccesses, in particular transitivity, balance, and small-world linkage. Higher-level network structures can be seen as emergent from lower-order interactional tendencies, like the habit of friends of friends to also become friends, or of networks to add long-distance ties between sparsely connected clusters.

➢ The (one and only) midterm exam covers material up to and including this week.

PART 2: EMPIRICAL APPLICATIONS OF RELATIONAL ANALYSIS

Week 5: Human Micro-Interaction and Bargaining

Undergraduate Readings: *Networks, Crowds, and Markets: Reasoning About a Highly Connected World*, Ch. 12 (up to section 12.9); Collins, Randall. 2014. *Interaction Ritual Chains*. Ch. 2

Graduate Readings: Burt, Ronald S. 1992. *Structural Holes: The Social Structure of Competition*. Ch. 1; Gibson, David R. 2012. *Talk at the Brink: Deliberation and Decision During the Cuban Missile Crisis*. Ch. 2

What happens when you squeeze lots of people in one space (e.g., a football stadium) and have them all pay attention to the same thing? There exists a grey area between explicit interaction and reaction to physically co-present humans doing the same thing, which can make the difference between a gathering, a crowd, a mass, and a mob. When it comes to bargaining, what you don't

know may hurt you tremendously, because the structure of our business partner's other business partners affects how likely they are to leave the negotiating table for a better deal.

Week 6: Political Economy & Human Health

Undergraduate Readings: Taylor, Peter J. 2001. "Specification of the World City Network." *Geographical Analysis* 33(2):181–94.; Christakis, Nicholas A. and James H. Fowler. 2009. *Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives*, pp. 94-105. Cohen, Sheldon, William J. Doyle, David P. Skoner, Bruce S. Rabin, and Jack M. Gwaltney. 1997. "Social Ties and Susceptibility to the Common Cold." *JAMA* 277(24):1940–44.

Graduate Readings: Snyder, David and Edward L. Kick. 1979. "Structural Position in the World System and Economic Growth, 1955-1970: A Multiple-Network Analysis of Transnational Interactions." *American Journal of Sociology* 84(5):1096–1126.; Wallerstein, Immanuel Maurice. 1974. *The Modern World-System*, Introduction.; Cornwell, Benjamin. 2009. "Good Health and the Bridging of Structural Holes." *Social Networks* 31(1):92–103.;

There's much talk about "globalisation" and "shrinking borders", but what does it actually mean for far-flung parts of the world to be in touch? Who does the concrete job of connecting the global village, and what's in it for them? Does connection make some places riches, precisely because it empoverishes others? Disease is one of the most obvious ways in which interaction betrays us, yet having a dense network of friends and family can also shelter you from the ravages of poor health.

Week 7: Non-Human Biological Networks

Undergraduate Readings: Tong, Amy Hin Yan et al. 2004. "Global Mapping of the Yeast Genetic Interaction Network." *Science* 303(5659):808–813.; Aplin, Lucy M. et al. 2015. "Experimentally Induced Innovations Lead to Persistent Culture via Conformity in Wild Birds." *Nature* 518:538–41.

Graduate Readings: Allesina, Stefano and Mercedes Pascual. 2008. "Network Structure, Predator–prey Modules, and Stability in Large Food Webs." *Theoretical Ecology* 1(1):55–64.; Chase, I. D., C. Tovey, D. Spangler-Martin, and M. Manfredonia. 2002. "Individual Differences versus Social Dynamics in the Formation of Animal Dominance Hierarchies." *Proceedings of the National Academy of Sciences* 99(8):5744–49.

We take a brief pause from human-oriented networks to consider other biological interactions. One edge of biological research studies gene interactions, to answer questions such as "which traits obtain when more than one gene is active?" Some genes are functionally related (they deal with the same pathway, like controlling a particular neurotransmitter), and can thus be mapped out in neighbourhoods of functional similarity. At the organism-level, research on cognition and social interaction in non-human animals has gotten to the point where we speak about cultural tradition in animal groups. This week we start explicitly asking what it means for us to use the same tool (network analysis) to study completely different phenomena (genes expressing). Are we explainig too much, or too little?

Week 8: Human-Animal Interaction

Undergraduate Readings: Tero, Atsushi et al. 2010. "Rules for Biologically Inspired Adaptive

Network Design." *Science* 327(5964):439–442.1.; Gunderson, Ryan. 2013. "From Cattle to Capital: Exchange Value, Animal Commodification, and Barbarism." *Critical Sociology* 39(2):259–275.

Graduate Readings: Callon, Michel. 1986. "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay." Pp. 196–223 in *Power, action and belief: a new sociology of knowledge?*, edited by J. Law. London, UK: Routledge.; Larson, Greger et al. 2005. "Worldwide Phylogeography of Wild Boar Reveals Multiple Centers of Pig Domestication." *Science* 307(5715):1618–1621.

We ease back into human-centered networks by looking at the ways in which we use and are used by our living brethren. We wear the skin of many of these creatures on top of our own, as well as eat their flesh (and other bodily secretions) and treat them as property. To the extent that human relationships with property and each other have changed over the course of history, so too has our relationship with animals. At the same time we are constantly inspired by and learn from the creatures around us, sometimes basing our mathematical models on their activities. Lastly, we are also used by animals, who also live in, on, around, and off us in a variety of manners, from oppression to symbiosis to indifference.

➢ The website/media review assignment is due this week.

Week 9: Human-Machine Interaction

Undergraduate Readings: Kline, Ronald R. 2000. *Consumers in the Country: Technology and Social Change in Rural America*. JHU Press. Ch.2.; Brin, Sergey and Lawrence Page. 1998. "The Anatomy of a Large-Scale Hypertextual Web Search Engine." *Computer Networks and ISDN Systems* 30(1):107–17.

Graduate Readings: Hughes, Thomas Parke. 1993. *Networks of Power: Electrification in Western Society, 1880-1930.*, Ch. 1; Fink, Clay, Aurora Schmidt, Vladimir Barash, Christopher Cameron, and Michael Macy. 2016. "Complex Contagions and the Diffusion of Popular Twitter Hashtags in Nigeria." *Social Network Analysis and Mining* 6(1):1.

Twenty-first century city life is technologically mediated in the sense that almost everything we do would be impossible without complex networks of human-made artefacts, usually called "infrastructure": power grids, roads, server farms, etc. Human technical change is driven by non-technical needs and wants while at the same time altering these needs and wants, as well as the way humans interact (one need only look at the history of Facebook platform updates to see this dialectic).

Week 10: Human Language

Undergraduate Readings: Miller, George A. 1995. "WordNet: A Lexical Database for English." *Communications of the ACM* 38(11):39–41.; Russell, James R. 2013. "On an Armenian Word List from the Cairo Geniza." *Iran and the Caucasus* 17(2):189–214.

Graduate Readings: Miller, George A., Richard Beckwith, Christiane Fellbaum, Derek Gross, and Katherine J. Miller. 1990. "Introduction to WordNet: An On-Line Lexical Database." *International Journal of Lexicography* 3(4):235–44.; Norvig, Peter and George Lakoff. 1987. "Taking: A Study in

Lexical Network Theory." Pp. 195–206 in *Annual Meeting of the Berkeley Linguistics Society*, vol. 13.

A large part of human interaction happens through symbol-bearing vocalisations and inscriptions (speaking and writing), and when this symbol set is understood and used by people in a group, and not by those outside of it, we call it a language. Human language is itself highly relational, in the sense that to know what someone is talking about we constantly have to make reference to other words, contextual information, previous history, facial expressions, etc. This is why it is possible for "dead" languages to be brought back to life (e.g., Sumerian, Modern Hebrew), or for new tongues to be invented whole cloth by one person (e.g., Klingon, Quenya).

Week 11: Symbolic Networks

Undergraduate Readings: Bearman, Peter S. and Katherine Stovel. 2000. "Becoming a Nazi: A Model for Narrative Networks." *Poetics* 27(2):69–90.; Barthes, Roland. 1972. *Mythologies*., essays entitled "The World of Wrestling", "Toys", "Striptease", and "Plastic".

Graduate Readings: Bearman, Peter, Robert Faris, and James Moody. 1999. "Blocking the Future: New Solutions for Old Problems in Historical Social Science." *Social Science History* 23(04):501–533.; Barthes, Roland. 1977. *Image, Music, Text*., essay entitled "The Death of the Author".

"Symbol" comes from the Greek *σύν* (sún, "with, together") + *βάλλω* (bállō, "I throw, put")[1], and human language does not exhaust all the ways that we can bring things together. In particular, the ordering of events and the refereces to other symbols (e.g., sights, sounds, smells) are crucial for coherent communication, especially the beautiful kind seen in dance and religious services.

> ➢ This week you must submit an outline of your final paper, with a list of five scholarly sources *not* on the syllabus.

Week 12: The Christian Trinity

Undergraduate Readings: Basil of Caesarea. 1950 [356?]. *Ascetical Works*., excerpt from "The Long Rule"; Scouteris, Constantine B. 2005. *Ecclesial Being: Contributions to Theological Dialogue*. Ch. 1

Graduate Readings: Augustine of Hippo. 1887 [417?]. *On the Holy Trinity*. Book V; Zizioulas, Jean. 1985. *Being as Communion: Studies in Personhood and the Church*. Introduction and "The Relational Character of the Ministry", pp. 214-225

Near as we can tell, humans have always pondered the relationship between themselves, the world, and whatever made it all happen. Different peoples have stressed different sources of creation, from endless loops of deities bearing other deities to one totally indivisible Creator who always was and never not was. Christian Trinitarianism is particularly interesting in this regard because it insists that God is both One and Three (Father, Son, and Holy Spirit) – blood has been spilled over this. One implication is that the Christian Church should relate internally and externally as the Persons of the Godhead relate to one another, and as the Godhead relates to creation.

---

1 *At least according to the wiktionary: https://en.wiktionary.org/wiki/symbol*

PART 3: WHEN IS NETWORK THINKING NOT USEFUL?

Week 13: Human Network Perception

Undergraduate Readings: Brashears, Matthew E. and Laura Aufderheide Brashears. 2016. "The Enemy of My Friend Is Easy to Remember: Balance as a Compression Heuristic." Pp. 1–31 in *Advances in Group Processes*, vol. 33, edited by S. Thye R. and E. Lawler. Emerald Group Publishing Limited.; Smith, Dorothy E. 1974. "Women's Perspective as a Radical Critique of Sociology." *Sociological Inquiry* 44(1):7–13.

Graduate Readings: Simpson, Brent, Barry Markovsky, and Mike Steketee. 2011. "Power and the Perception of Social Networks." *Social Networks* 33(2):166–171.; Abbott, Andrew Delano. 2001. *Chaos of Disciplines*. Ch. 6, appendix.

The funny thing about connections is that we perceive them whether or not they're actually there. This week we look at how human perception handles relational patterns, and how some objective aspects of social structure (e.g., power hierarchies) translate into differential forms of subjective sight (e.g., it's lonely at the top). In fact, some social structures seem to consistently favour perceptual innaccuracy: consider the expression "privilege is invisible to those who have it."

Week 14: Networks of Anything?

Undergraduate Readings: Watts, Duncan J. and Steven H. Strogatz. 1998. "Collective Dynamics of 'Small-World' Networks." *Nature* 393(6684):440.; Cartwright, Nancy. 2004. "Causation: One Word, Many Things." *Philosophy of Science* 71(5):805–19.

Graduate Readings: Laumann, Edward, Peter V. Marsden, and David Prensky. 1989. "The Boundary Specification Problem in Network Analysis." Pp. 61–87 in *Research Methods in Social Network Analysis*, edited by L. C. Freeman, D. R. White, and A. K. Romney. Fairfax, VA: George Mason University Press.; Faust, Katherine and John Skvoretz. 2002. "Comparing Networks across Space and Time, Size and Species." *Sociological Methodology* 32(1):267–299.

Over the course of the semester we've encountered an embarrassingly wide variety of phenomena that we can draw as nodes connected by edges – in fact, I've asked you to network sketch just about anything. Some researchers talk about the network properties of power grids, brains, and friendship groups in the same breath, hinting that networks are some kind of transcendental structure of reality, with relationality as the golden thread to true Knowledge.

Week 15: Alternatives to Relationalism

Undergraduate Readings: Zuckerman, Ezra. 2010. "Why Social Networks Are Overrated: Downsides of the Commensuration That Underlies Social Network Analysis." *Perspectives: Newsletter of the ASA Theory Section*, May, 3–5,15.; Antony, Louise. 1995. "Sisters, Please, I'd Rather Do It Myself: A Defense of Individualism in Feminist Epistemology." *Philosophical Topics* 23(2):59–94.; Liu, Sida and Mustafa Emirbayer. 2016. "Field and Ecology." *Sociological Theory* 34(1):62–79.

Graduate Readings: Martin, John Levi. 2003. "What Is Field Theory?" *American Journal of*

Sociology 109(1):1–49.; Mosteller, Frederick and David L. Wallace. 1963. "Inference in an Authorship Problem." *Journal of the American Statistical Association* 58(302):275–309.

Once something becomes an "-ism" adherents are usually discouraged from considering alternatives. By now you've seen enough applications of relational and network thinking (and drawn enough awkward sketches) to appreciate some of its limits. We discuss these limits and return to two paradigms from the first week of class – atomism and fieldism.

Course Schedule – Table

Theme	Week	Reading: Undergrad	Reading: Grad	Assignment Due
Relationality & Levels of Analysis	1	Monge and Contractor, Ch.1, excerpt; Christakis & Fowler, Ch.9	Simmel, *The Web of Group Affiliations*; Emirbayer 1997	
Networks as Graphs, part 1: Connectivity	2	Wasserman & Faust Chs. 2-4	Wasserman & Faust Chs. 2-4	
Networks as Graphs, part 2: Centrality and Clustering	3	Wasserman & Faust, Chs. 5-8	Wasserman & Faust, Chs. 5-8; Flache & Macy 2011	
Networks as Graphs, part 3: Homophily and Dynamics	4	Travers & Milgram 1967, Granovetter 1973, Monge & Contractor, Ch.8	McPherson, Smith-Lovin & Cook 2001; Mercken et al. 2009; Monge & Contractor, Ch. 6;	
Human Networks, part 1: a) interaction b) bargaining	5	Kleinberg & Easley, Ch.12; Collins 2004, Ch.2	Gibson 2012, Ch2.; Burt 1992, Ch.1	
Human Networks, part 2: a) world system, b) human health	6	Taylor 2001; Christakis & Fowler Ch.4, excerpt; Cohen and Rabin 1997	Snyder & Kick 1979; Wallerstein 1974, Intro; Cornwell 2009	
Biological Networks	7	Tong et al. 2004; Alpin et al 2014	Allesina & Pascual 2008; Chase et al. 2002	
Human – Non-human animal interaction	8	Tero et al. 2004; Gunderson 2011	Callon 1984; Larson et al. 2005	
Human-Machine Interaction	9	Kline 2000, Ch.2; Brin & Page 1998	Hughes 1993, Ch1; Fink et al. 2016	
Human Language	10	Miller 1995; Russell 2013	Miller 1990; Norvig & Lakoff 1987	
Symbolic Networks	11	Bearman & Stovel 2000; Barthes 1972, excerpt	Bearman et al. 1999; Barthes 1977, excerpt	
Theology: Christian Trinitarianism	12	Scouteris 2006, Ch.1; Basil of Caesarea 356, excerpts;	Augustine of Hippo 417, excerpts; Zizioulas 1985, excerpts	
Human Network Perception	13	Brashears & Brashears 2016; Smith 1974	Simpson et al. 2011; Abbott 2001, Ch.6, excerpt	

Meta Points: Networks in Our Minds of Networks in the World	14	Watts & Strogatz 1998; Cartwright 2004	Faust & Skvoretz 2002; Laumann et al. 1989	
Beyond Networks	15	Liu & Emirbayer 2016; Antony 1995; Zuckerman 2010	Martin 2003 ; Mosteller and Wallace 1963	

Course Materials/Reading List

Abbott, Andrew Delano. 2001. *Chaos of Disciplines*. Chicago: University of Chicago Press.

Allesina, Stefano and Mercedes Pascual. 2008. "Network Structure, Predator–prey Modules, and Stability in Large Food Webs." *Theoretical Ecology* 1(1):55–64.

Antony, Louise. 1995. "Sisters, Please, I'd Rather Do It Myself: A Defense of Individualism in Feminist Epistemology." *Philosophical Topics* 23(2):59–94.

Aplin, Lucy M. et al. 2015. "Experimentally Induced Innovations Lead to Persistent Culture via Conformity in Wild Birds." *Nature* 518:538–41.

Augustine of Hippo. 1887. *On the Holy Trinity*. Vol. 3. Peabody, MA: Hendrickson.

Barthes, Roland. 1977. *Image, Music, Text*. New York: Hill and Wang.

Barthes, Roland. 1972. *Mythologies*. London, UK: Paladin.

Basil of Caesarea. 1950. *Ascetical Works*. Washington: Catholic University of America Press.

Bearman, Peter, Robert Faris, and James Moody. 1999. "Blocking the Future: New Solutions for Old Problems in Historical Social Science." *Social Science History* 23(04):501–533.

Bearman, Peter S. and Katherine Stovel. 2000. "Becoming a Nazi: A Model for Narrative Networks." *Poetics* 27(2):69–90.

Brashears, Matthew E. and Laura Aufderheide Brashears. 2016. "The Enemy of My Friend Is Easy to Remember: Balance as a Compression Heuristic." Pp. 1–31 in *Advances in Group Processes*. Vol. 33, edited by S. Thye R. and E. Lawler. Emerald Group Publishing Limited.

Brin, Sergey and Lawrence Page. 1998. "The Anatomy of a Large-Scale Hypertextual Web Search Engine." *Computer Networks and ISDN Systems* 30(1):107–17.

Burt, Ronald S. 1992. *Structural Holes: The Social Structure of Competition*. Harvard University Press.

Callon, Michel. 1986. "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay." Pp. 196–223 in *Power, action and belief: a new sociology of knowledge?*, edited by J. Law. London, UK: Routledge.

Cartwright, Nancy. 2004. "Causation: One Word, Many Things." *Philosophy of Science* 71(5):805–19.

Chase, I. D., C. Tovey, D. Spangler-Martin, and M. Manfredonia. 2002. "Individual Differences versus Social Dynamics in the Formation of Animal Dominance Hierarchies." *Proceedings of the National Academy of Sciences* 99(8):5744–49.

Christakis, Nicholas A. and James H. Fowler. 2009. *Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives*. Little, Brown.

Cohen, Sheldon, William J. Doyle, David P. Skoner, Bruce S. Rabin, and Jack M. Gwaltney. 1997. "Social Ties and Susceptibility to the Common Cold." *JAMA* 277(24):1940–44.

Collins, Randall. 2014. *Interaction Ritual Chains*. Princeton University Press.

Cornwell, Benjamin. 2009. "Good Health and the Bridging of Structural Holes." *Social Networks* 31(1):92–103.

Easley, David and Jon Kleinberg. 2010. *Networks, Crowds, and Markets: Reasoning About a Highly Connected World*. Cambridge University Press.

Emirbayer, Mustafa. 1997. "Manifesto for a Relational Sociology." *American Journal of Sociology* 103(2):281–317.

Faust, Katherine and John Skvoretz. 2002. "Comparing Networks across Space and Time, Size and Species." *Sociological Methodology* 32(1):267–299.

Fink, Clay, Aurora Schmidt, Vladimir Barash, Christopher Cameron, and Michael Macy. 2016. "Complex Contagions and the Diffusion of Popular Twitter Hashtags in Nigeria." *Social Network Analysis and Mining* 6(1):1.

Flache, Andreas and Michael W. Macy. 2011. "Small Worlds and Cultural Polarization." *The Journal of Mathematical Sociology* 35(1–3):146–76.

Gibson, David R. 2012. *Talk at the Brink: Deliberation and Decision During the Cuban Missile Crisis*. Princeton University Press.

Granovetter, Mark S. 1973. "The Strength of Weak Ties." *American Journal of Sociology* 78(6):1360–80.

Gunderson, Ryan. 2013. "From Cattle to Capital: Exchange Value, Animal Commodification, and Barbarism." *Critical Sociology* 39(2):259–275.

Hughes, Thomas Parke. 1983. *Networks of Power: Electrification in Western Society, 1880-1930*. JHU Press.

Kline, Ronald R. 2000. *Consumers in the Country: Technology and Social Change in Rural America*. JHU Press.

Larson, Greger et al. 2005. "Worldwide Phylogeography of Wild Boar Reveals Multiple Centers of

Pig Domestication." *Science* 307(5715):1618–1621.

Laumann, Edward, Peter V. Marsden, and David Prensky. 1989. "The Boundary Specification Problem in Network Analysis." Pp. 61–87 in *Research Methods in Social Network Analysis*, edited by L. C. Freeman, D. R. White, and A. K. Romney. Fairfax, VA: George Mason University Press.

Liu, Sida and Mustafa Emirbayer. 2016. "Field and Ecology." *Sociological Theory* 34(1):62–79.

Martin, John Levi. 2003. "What Is Field Theory?" *American Journal of Sociology* 109(1):1–49.

McPherson, Miller, Lynn Smith-Lovin, and James M. Cook. 2001. "Birds of a Feather: Homophily in Social Networks." *Annual Review of Sociology* 415–444.

Mercken, Liesbeth, Tom A. B. Snijders, Christian Steglich, and Hein de Vries. 2009. "Dynamics of Adolescent Friendship Networks and Smoking Behavior: Social Network Analyses in Six European Countries." *Social Science & Medicine* 69(10):1506–14.

Miller, George A. 1995. "WordNet: A Lexical Database for English." *Communications of the ACM* 38(11):39–41.

Miller, George A., Richard Beckwith, Christiane Fellbaum, Derek Gross, and Katherine J. Miller. 1990. "Introduction to WordNet: An On-Line Lexical Database." *International Journal of Lexicography* 3(4):235–44.

Monge, Peter R. and Noshir S. Contractor. 2003. *Theories of Communication Networks*. Oxford University Press, USA.

Mosteller, Frederick and David L. Wallace. 1963. "Inference in an Authorship Problem." *Journal of the American Statistical Association* 58(302):275–309.

Norvig, Peter and George Lakoff. 1987. "Taking: A Study in Lexical Network Theory." Pp. 195–206 in *Annual Meeting of the Berkeley Linguistics Society*. Vol. 13.

Russell, James R. 2013. "On an Armenian Word List from the Cairo Geniza." *Iran and the Caucasus* 17(2):189–214.

Scouteris, Constantine B. 2005. *Ecclesial Being: Contributions to Theological Dialogue*. Mount Thabor Publications.

Simmel, George. 1955. *Conflict And The Web Of Group Affiliations*. Free Press.

Simpson, Brent, Barry Markovsky, and Mike Steketee. 2011. "Power and the Perception of Social Networks." *Social Networks* 33(2):166–171.

Smith, Dorothy E. 1974. "Women's Perspective as a Radical Critique of Sociology*." *Sociological Inquiry* 44(1):7–13.

Snyder, David and Edward L. Kick. 1979. "Structural Position in the World System and Economic Growth, 1955-1970: A Multiple-Network Analysis of Transnational Interactions." *American*

Journal of Sociology 84(5):1096–1126.

Taylor, Peter J. 2001. "Specification of the World City Network." *Geographical Analysis* 33(2):181–94.

Tero, Atsushi et al. 2010. "Rules for Biologically Inspired Adaptive Network Design." *Science* 327(5964):439–442.

Tong, Amy Hin Yan et al. 2004. "Global Mapping of the Yeast Genetic Interaction Network." *Science* 303(5659):808–813.

Travers, Jeffrey and Stanley Milgram. 1967. "The Small World Problem." *Phychology Today* 1(1):61–67.

Wallerstein, Immanuel Maurice. 1974. *The Modern World-System*. New York: Academic Press.

Wasserman, Stanley and Katherine Faust. 1994. *Social Network Analysis: Methods and Applications*. Vol. 8. Cambridge, UK: Cambridge University Press.

Watts, Duncan J. and Steven H. Strogatz. 1998. "Collective Dynamics of 'Small-World' Networks." *Nature* 393(6684):440.

Zizioulas, Jean. 1985. *Being as Communion: Studies in Personhood and the Church*. Crestwood, N.Y.: St. Vladimir's Seminary Press.

Zuckerman, Ezra. 2010. "Why Social Networks Are Overrated: Downsides of the Commensuration That Underlies Social Network Analysis." *Perspectives: Newsletter of the ASA Theory Section*, May, 3–5,15.